

Tom Petty died from a cardiac arrest – what makes this different to a heart attack and heart failure?

Written by Anna Beale, Medical doctor, PhD candidate in cardiology, Monash University

Rolling Stone magazine landed in a spot of bother on Monday after publicising news of rock star Tom Petty's [death prematurely](#), while others said it was the [result of a heart attack](#) rather than a cardiac arrest. Petty unfortunately did subsequently pass away, from a [cardiac arrest](#), but it's important to note neither a cardiac arrest nor a heart attack is synonymous with death.

Albeit infrequently, sufferers of cardiac arrest [can be revived](#) and a heart attack is associated with a [relatively low](#) risk of dying within 18 months with current treatment in Australia. Both are types of heart disease, as is heart failure. So what are the differences between cardiac arrest, heart attack and heart failure?



The heart beats in a very controlled and synchronised manner.
Cardiac arrest

The easiest way to understand these conditions is to think of the heart like a building and approach it like a tradesman. Cardiac arrest is the sparkie's domain because it's essentially an electrical failure. The heart beats in a very controlled and synchronised manner, due to a flow of electricity from the "pacemaker" cells at the top of the heart (sinoatrial node) steadily down to the base.

The wiring is present throughout the heart, because the heart muscle cells themselves transmit and respond to this electrical signal, beating as it travels through and powers them. But there are also "mains" electricity circuits that direct the flow of energy and can act as backups along the way if one part of the circuit fails. These are the atrioventricular node, "bundle of His" and "Purkinje fibres" – all can cause the heart to beat, but at a slower rate than the sinoatrial node.

Read more – [How Australians Die: cause #1 heart diseases and stroke](#)

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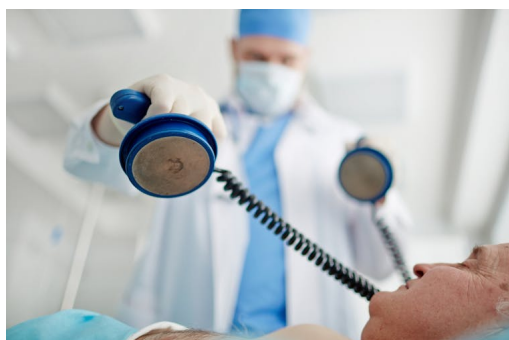
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All this doesn't always go according to plan. Diseases such as blocked arteries, genetic conditions and degeneration of the heart with ageing can cause disruptions to the circuit.

This may result in two things. The first is a power failure, with no electricity whatsoever – called “asystole”. The second is a surge of electricity from an area of the heart muscle that is disruptive and prevents the heart from pumping properly – the most dangerous of these surges are commonly referred to as ventricular arrhythmias. These are the two main types of cardiac arrest.

Both these conditions will stop the heart pumping. Because blood can no longer travel to the brain, the person will lose consciousness.

In the movies, they are treated with defibrillator paddles delivering electric shocks in a dramatic manner. But while this is an important treatment for ventricular arrhythmias, as it is able to re-organise the surge of electricity, it is ineffective for asystole (where there is no electricity at all).



In the movies, people with cardiac arrest are treated with paddles delivering electric shocks in a dramatic manner.[from shutterstock.com](#)

In this case, [good-quality CPR](#) is crucial. If someone is left too long without blood supply to their brain and the rest of the body, they will die. Survival from cardiac arrest occurring outside of a hospital setting [in Australia](#) is 24% after the day of event, dropping to 11.5% at one year later.

Heart attack

This is the plumber's area. While a heart attack is often used to describe a range of heart problems, it actually refers to what is medically termed an acute myocardial infarction, or AMI.

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The heart provides blood to the rest of the body, but it also needs its own blood supply and does not get it from the blood that flows through its chambers. Instead, the heart is supplied with blood, giving oxygen and taking away carbon dioxide, by arteries and veins that sit on the outside of the heart.

But our Western diet and lifestyle have contributed to extremely high rates of disease inside these arteries, termed “[atherosclerosis](#)”. This causes the arteries to narrow and can lead to sudden blockages, which result in heart attacks.

AMIs usually occur when there is a sudden rupture of the atherosclerotic plaque, containing cholesterol, fatty cells and immune cells. This causes a large blood clot to form, blocking off the blood flow.



The heart is supplied with blood, giving oxygen and taking away carbon dioxide, by arteries and veins that sit on the outside of the heart.from shutterstock.com

When the heart muscle tissue that is usually supplied by these arteries no longer receives blood and oxygen, it starts to die within minutes, causing intense pain. Within [90 minutes](#), that whole section of heart wall can die, meaning it will not beat. This reduces the overall performance of the heart and predisposes it to the aforementioned ventricular arrhythmias (the dangerous surge of electricity).

Fortunately, modern medicine has markedly improved survival from heart attacks. In 1960, [one-third](#) of people died within a month of having a heart attack. This improved to [16% 18 months after having one](#) in Australia in 2012.

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Read more: [Women have heart attacks too, but their symptoms are often dismissed as something else](#)

Even though the survival rate from heart attacks is quite high, the burden of disease is heavy. Heart attacks are responsible for 12% of all deaths in Australia, and one Australian dies from a “heart attack” [every 27 minutes](#) .

Heart failure

Heart failure is a structural issue, so it’s the carpenter’s problem. It results from the heart being unable to adequately supply the body with blood, so the tissues don’t receive oxygen and other nutrients, and blood pools in the legs, abdomen and lungs. Heart failure either results from weakness in the strength of the pump, or stiffening of the heart so it loses elasticity and can’t fill with blood in the first place.

It is the end result of a [myriad of conditions](#) , from genetic disorders, to heart attacks, to infections and high blood pressure. Heart failure is more chronic than the other two. People with heart failure see a gradual worsening of shortness of breath, fatigue, swelling and light-headedness, with a significant impact on quality of life.

Read more: [What is heart failure?](#)

Death from heart failure is often as a result of cardiac arrest, as disruption to the construction of the house causes electricity problems too; along with organ failure from lack of oxygen supply due to failure to pump the blood and also fluid in the lungs reducing oxygen transfer.

The good news is all three of these conditions can [largely be prevented](#) and treated with a healthy lifestyle, seeing your doctor and taking medications to reduce your risk of heart disease.
